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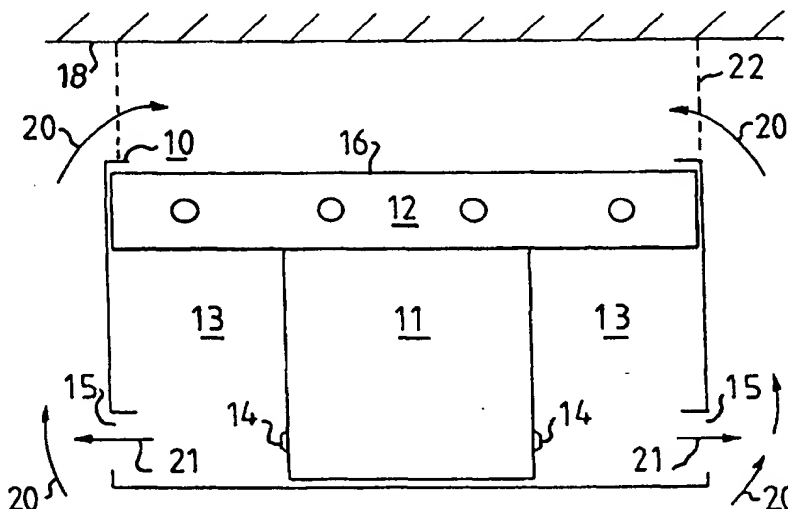
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(21) International Application Number: PCT/SE00/00154 (22) International Filing Date: 26 January 2000 (26.01.00) (30) Priority Data: 9900214-9 26 January 1999 (26.01.99) SE (71) Applicant (for all designated States except US): STIFAB FAREX AB [SE/SE]; P.O. Box 979, S-671 29 Arvika (SE). (72) Inventors; and (75) Inventors/Applicants (for US only): TIGÉR, Jonas [SE/SE]; Stenrikevägen 36, S-671 33 Arvika (SE). BIÖRKLUND, Staffan [SE/SE]; Ingersbyn 5, S-670 35 Gunnarskog (SE). ERICKSSON, Göran [SE/SE]; Pilbägsvägen 2, S-184 60 Åkersberga (SE). (74) Agents: BERG, S., A. et al.; Albihns Patentbyrå Stockholm AB, P.O. Box 5581, S-114 85 Stockholm (SE).	(81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. In English translation (filed in Swedish).	

(54) Title: DEVICE FOR CEILING MOUNTING FOR VENTILATION OF ROOMS AND SIMULTANEOUS COOLING OR HEATING OF THE ROOM AIR

(57) Abstract

Ceiling-mounted apparatus for ventilation of premises and simultaneously cooling and/or heating of the room air, which apparatus comprises a free-hanging baffle (10) for cooling/heating. It has a longitudinal channel (11) for supply of primary air, at least one battery (12) for cooling/heating the room air, at least one mixing chamber (13) for cooled/heated room air and primary air, members (14) for supplying primary air to each mixing chamber (13) with an induction effect which ensures both suction of room air into the apparatus and its onward passage through the batteries (12), and also outlet openings (15) for an essentially horizontally outflowing mixture of cooled/heated room air and primary air. The apparatus is



characterized in that a battery (12) is arranged at least on one side of the longitudinal primary air channel (11) or is directly connected under this, in that under each battery (12) there is a distribution chamber (16) for receiving room air flowing in through openings in its bottom part (17) and for onward distribution of the air to the battery (12) or the batteries, and in that the mixing chamber (13) or the mixing chambers is/are arranged above each battery (12) so that the apparatus, in the mounted state, has each mixing chamber (13) situated adjacent to the ceiling (18) of the premises or at least near this, in order thereby to ensure a horizontal outflow of the air mixture near to and along the ceiling (18).

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DEVICE FOR CEILING MOUNTING FOR VENTILATION OF ROOMS AND
SIMULTANEOUS COOLING OR HEATING OF THE ROOM AIR

5 The invention relates to a ceiling-mounted apparatus for ventilation of premises and simultaneous cooling and/or heating of the room air. The apparatus comprises a free-hanging baffle for cooling/heating, which baffle has a longitudinal channel for supply of primary air, at least one battery for cooling/heating the room air, at least one mixing chamber for cooled/heated
10 room air and primary air, and members for supplying primary air to each mixing chamber with an induction effect which ensures both suction of room air into the apparatus and its onward passage through the batteries, and also outlet openings for an essentially horizontally outflowing mixture of cooled/heated room air and primary air.

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Previously known ceiling-mounted apparatuses for ventilation and cooling/heating of the free-hanging type, which as such are mounted wholly under the ceiling and, unlike other similar ceiling-mounted apparatuses, are not recessed wholly or partially in the ceiling, are associated with a number of
20 disadvantages. Since the air intake is designed for air flowing in from above in these known free-hanging baffles, circulation openings of 50 to 100 mm between ceiling and baffle are needed, and since the air flows out in the lower part, the apparatuses have to be high up in the premises so as not to cause unnecessary draught problems. Another disadvantage is that heated/cooled
25 room air cannot be blown out along and near to the ceiling, which on the one hand is desirable for flow technology reasons and on the other hand causes the least possible draught in the premises. In known free-hanging apparatuses, the air therefore has to be blown out at the lower part of the apparatus, similarly to the known apparatuses intended to be recessed in the ceiling. This in turn
30 entails a further disadvantage, namely that the treated air flowing out crosses the path of the room air which is being sucked into the apparatus from above. In the case of the recessed apparatuses, the problem of getting the air to flow out near to and along the ceiling is therefore solved quite simply by the recessed

fitting, so that the lower part of the apparatus coincides with or lies near the level of the ceiling. Reference may be made here, for example, to the apparatuses which are described in our earlier publications EP-B-0692084, EP-
5 A-0857283 and in applications SE-A-9802215-5 and SE-A-9802216-3, all of which apparatuses allow the treated air to be blown out close to and along the ceiling of the premises.

The object of the invention is to make available a ceiling-mounted apparatus, of
10 the type described in the introduction, with a free-hanging baffle, but without the disadvantages which have been associated with these. Thus, the apparatus according to the invention has less structural height than previously known free-hanging baffles, and at the same time the treated air is blown out near to and along the ceiling. The stated problem of intersecting air streams is also
15 completely eliminated.

To this end, the invention is characterized by the features which are set out in the attached claims.

20 In the apparatus according to the invention, a battery is arranged at least on one side of the longitudinal primary air channel or is directly connected under this. Under each battery there is a distribution chamber for receiving room air flowing in through openings in its bottom part and for onward distribution of the air to the battery or the batteries, and the mixing chamber or the mixing
25 chambers is/are arranged above each battery so that the apparatus, in the mounted state, has each mixing chamber situated adjacent to the ceiling or at least near this, in order thereby to ensure a horizontal outflow of the air mixture near to and along the ceiling.

30 The bottom part of the distribution chamber has either a perforated plate, one or more gaps, or a screen, for distributing the inflowing room air to the battery or the batteries.

The apparatus is preferably designed with a battery arranged on both sides of the primary air channel, but in special cases, for example because of the positioning in the premises, it may be desirable to have only one battery, i.e. in practice half a baffle, in which case the apparatus can be mounted with the primary air channel running longitudinally close to a wall. The battery or the batteries can be arranged parallel to the ceiling or, in those cases where the primary air channel is designed with sides which are inclined in relation to the ceiling, the battery or the batteries can also be arranged correspondingly at an inclination to the ceiling.

The mixing chamber can either as a whole constitute part of the actual baffle and thus have its own upper boundary surfaces, or it is formed only when the baffle is mounted next to the ceiling, in which case the ceiling itself will constitute the upper boundary surface of the mixing chamber.

Some of the important advantages which the invention affords in comparison to previously known free-hanging types can be summarized as follows:

- Circulating air (hot) is here completely separated from the mixture of circulating/primary air (cold). Previously known free-hanging apparatuses are associated with problems of "short-circuiting", when hot circulating air which has been sucked in and is flowing upwards along the vertical side of the baffle has to pass (cross) the cold mixture of primary air/circulating air which is being blown out from the vertical side of the baffle.
- Less structural height is needed, as the baffle can be advantageously mounted close to the ceiling.
- The casting lengths for the treated air being blown out, mixed with primary air, are extended by the fact that the air mixture can be blown out along and directly adjacent to the ceiling. Extended casting lengths afford increased mixing of room air, which means less risk of draught and improved utilization of ceiling and walls.

The invention will now be described in greater detail with reference to the drawings, in which the Figures show a number of different embodiments of the invention, and also, for comparison, a description of the prior art.

5

Figure 1 shows a diagram of a known construction and has also been labelled PRIOR ART, while Figures 2 to 6 show diagrams of five different preferred embodiments of the invention.

- 10 Figure 1 shows a known apparatus (PRIOR ART) with a free-hanging baffle 10 seen in cross section, which baffle 10 is arranged at a distance from a ceiling 18 and has a longitudinal primary air channel 11 and a battery 12 for cooling/heating the room air. Under the battery 12, on each side of the primary air channel 11, there are mixing chambers 13 with outlet openings 15, which
- 15 chambers 13 are intended for mixing primary air, supplied via members 14, and room air which has been drawn by induction from this primary air and has passed the battery 12 and thus been cooled or heated, depending on the function of the apparatus. Above the battery 12, there is a distribution chamber 16 where the room air is distributed across the whole battery 12 before passing
- 20 through the latter. During use of the apparatus, primary air is supplied through the channel 11 with such energy that, as a result of induction, i.e. under-pressure created in the mixing chamber 13, it sucks room air from above into the baffle 10, as has been indicated by the arrows 20. This room air is sucked further down through the battery 12 and into the mixing chamber 13 where it
- 25 meets and is mixed with primary air supplied via the members 14, which can be of a nozzle type. The air thus treated and mixed is blown out through the openings 15 at a distance from the ceiling 18, as is indicated by the arrows 21. When this air stream 21 emerges from the baffle 10, it meets an upwardly flowing stream of room air 20, which causes problems since a certain and
- 30 unintended mixing of these streams cannot be avoided, which is contrary to the intended function of the baffle.

Figures 2 to 7 show examples of various embodiments of an apparatus according to the invention; Figures 2 to 5 show apparatuses with a rectangular or square primary air channel, and with the batteries parallel to the ceiling, while
5 Figures 6 and 7 show a variant, which may sometimes be preferred, with the battery or the batteries at an angle to the ceiling. All the apparatuses according to Figures 2 to 7 also have baffles 10, batteries 12 for cooling/heating, mixing chambers 13, members 14 for supply of primary air, outlet openings 15, and distribution chambers 16. The common feature of the embodiments according to
10 the invention, which also distinguishes it from the known apparatus in Figure 1, is that the mixing chamber 13 is arranged above or obliquely above the batteries 12 and, consequently, the distribution chamber is arranged under these. Room air 20 thus passes from underneath into the distribution chamber 16 and upwards through the batteries 12 to the mixing chamber 13, where the
15 air meets the primary air which has been blown in through the members (nozzles) 14 arranged near the ceiling 18. The resulting mixture of treated room air and primary air flows out from the mixing chamber 13 near the ceiling 18 and in a horizontal direction, which is indicated by the arrows 21. It will be appreciated that the inward and outward air streams do not cross each other
20 here, and the risk of short-circuiting is therefore eliminated.

According to the invention, the room air can be drawn into the distribution chamber by means of its bottom part 17 being designed as a perforated plate, as is indicated in Figure 2, through a screen, as is indicated in Figure 5, or
25 through one or more gaps, as is indicated in Figure 6.

The baffle 10 can be placed close to the ceiling, as is indicated in Figures 2 and 4-6, or hanging down, as in Figure 3. In those cases where the baffle 10 is placed close to the ceiling, the upper part 19 of the mixing chamber, its roof,
30 can advantageously consist of the ceiling 18. The baffle 10 can also include

such a roof 19; this is necessary in the hanging design, but can also be used in baffles intended to be placed close to the ceiling.

5 In those cases where the primary air channel has a rectangular or square shape, the battery or the batteries 12 can be placed on the vertical sides of the primary air channel 13, as is indicated in Figures 2-3 and 5-6, or under the primary air channel 13 directly connected to its bottom part, as is indicated in Figure 4.

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In those cases where the primary air channel 11 has a triangular shape, as is indicated in Figures 6 and 7, the battery or the batteries 12 are inclined in relation to the ceiling 18, and preferably at right angles to the side of the primary air channel 11.

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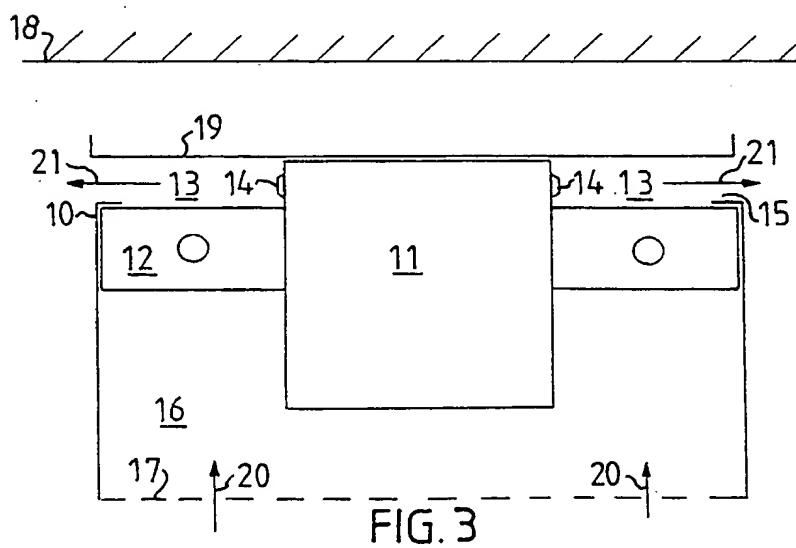
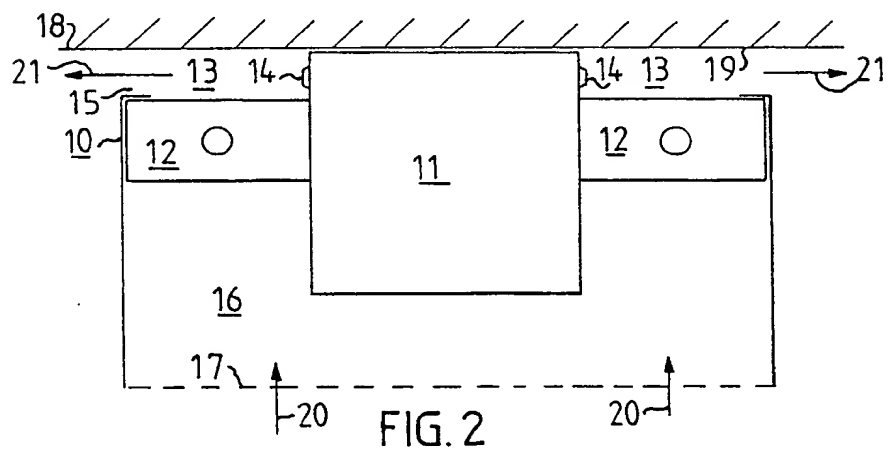
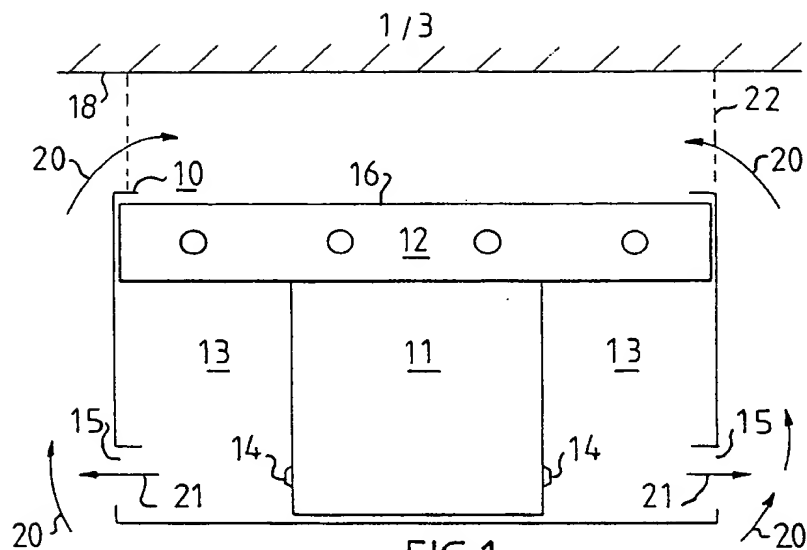
If the primary air channel 11 has a shape other than square or triangular, as illustrated here in the figures, batteries 12 can preferably be arranged either horizontally at right angles to a vertical side, if such exists, in the same way as with a square channel, or inclined in relation to the ceiling 18, in the same way

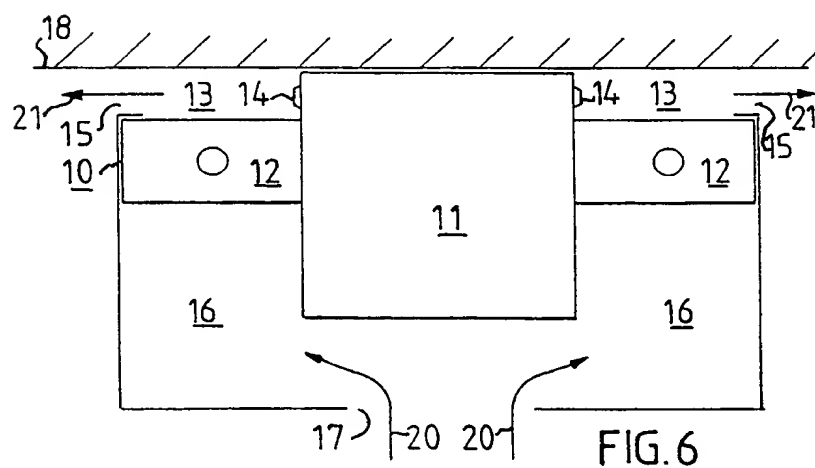
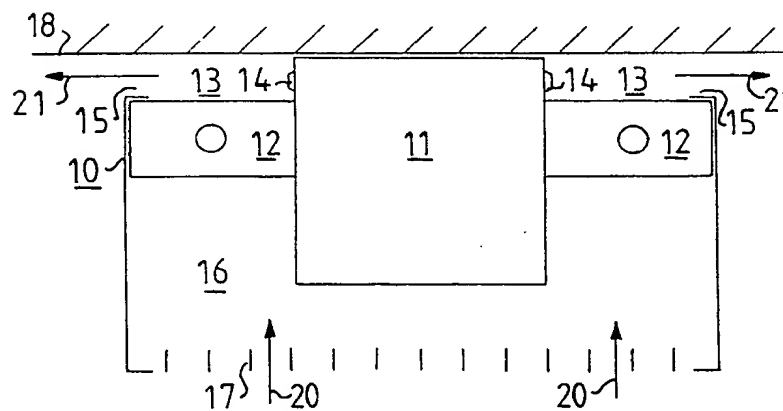
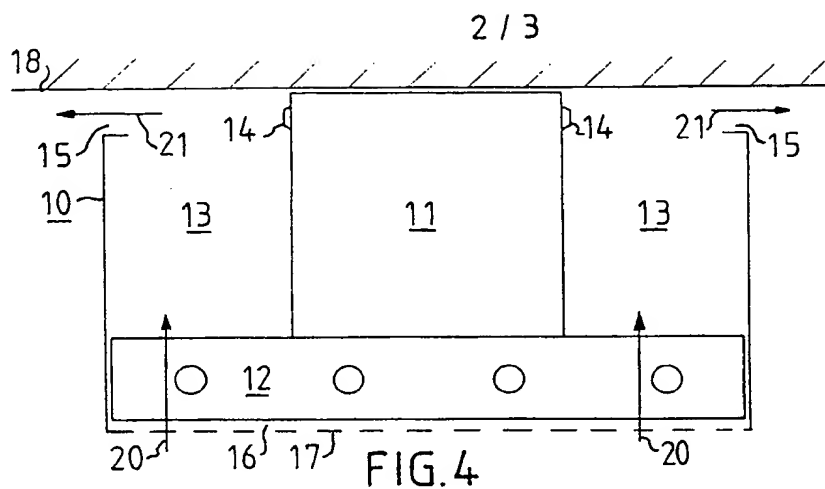
20 as with the triangular channel 11.

CLAIMS

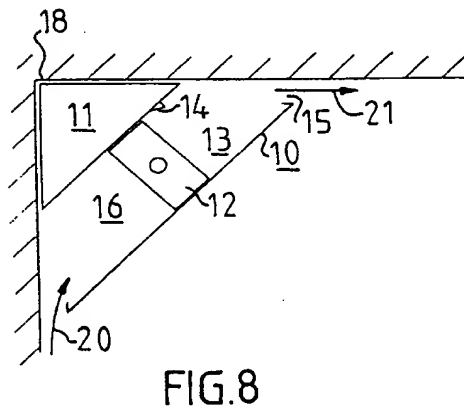
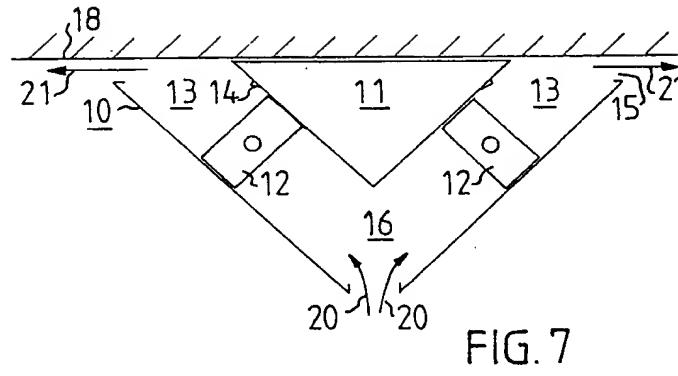
1. Ceiling-mounted apparatus for ventilation of premises and simultaneous
5 cooling and/or heating of the room air, which apparatus comprises a free-
hanging baffle 10 for cooling/heating, which has a longitudinal channel 11 for
supply of primary air, at least one battery 12 for cooling/heating the room air, at
least one mixing chamber 13 for cooled/heated room air and primary air,
members 14 for supplying primary air to each mixing chamber 13 with an
10 induction effect which ensures both suction of room air into the apparatus and
its onward passage through the batteries 12, and also outlet openings 15 for an
essentially horizontally outflowing mixture of cooled/heated room air and
primary air, characterized in that a battery 12 is arranged at least on one side of
the longitudinal primary air channel 11 or is directly connected under this, in
15 that under each battery 12 there is a distribution chamber 16 for receiving room
air flowing in through openings in its bottom part 17 and for onward distribution
of the air to the battery 12 or the batteries, and in that the mixing chamber 13 or
the mixing chambers is/are arranged above each battery 12 so that the
apparatus, in the mounted state, has each mixing chamber 13 situated adjacent
20 to the ceiling 18 of the premises or at least near this, in order thereby to ensure
a horizontal outflow of the air mixture near to and along the ceiling 18.
2. Apparatus according to Claim 1, characterized in that the bottom part 17 of
the distribution chamber comprises a perforated plate.
- 25 3. Apparatus according to Claim 1, characterized in that the bottom part 17 of
the distribution chamber comprises one or more gaps.
4. Apparatus according to Claim 1, characterized in that the bottom part of the
30 distribution chamber comprises a screen.

5. Apparatus according to Claims 1 to 4, characterized in that a battery 12 is arranged on both sides of the primary air channel 11.
- 5 6. Apparatus according to Claims 1 to 5, characterized in that its mixing chamber 13 is arranged with upper boundary surfaces 19.
7. Apparatus according to Claims 1 to 5, characterized in that, in the mounted state, the upper boundary surfaces 19 of its mixing chamber 13 are formed by
- 10 the actual ceiling 18.





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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 00/00154

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: F24F 1/00, F24F 5/00, F24F 7/00, F24F 13/072

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: F24F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	WO 9424491 A1 (FAREX AB), 27 October 1994 (27.10.94), figures 1-4, claims 1-4 --	1-7
A	GB 2271175 A (HALTON OY), 6 April 1994 (06.04.94), figures 1-3 --	
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☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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P	SE 9802215 A (STIFAB FAREX AB), 24 December 1999 (24.12.99), see figure, claims 1-7 -- -----	1-7

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Information on patent family members

02/12/99

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